THE NEOTROPICAL SPECIES OF THE ANT GENUS STRUMIGENYS FR. SMITH: GROUP OF SMITHII FOREL

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Below are offered results of studies on *Strumigenys smithii* Forel and a few related species. Other groups are treated in separate papers, to be followed by a key to the genus as found in the Western Hemisphere. In citing measurements and proportions, I have used the abbreviations standard in my works on the dacetines: TL, total outstretched length of insect, including mandibles, as measured by separate tagmata; HL, maximum measurable length of head from dorsal view, including all of clypeus and occipital lobes; ML, distance from anteriormost point of the anterior clypeal border to which the apices of the closed mandibles extend; WL (when given), diagonal length of visible alitrunk as seen from the side. Otherwise, "L" denotes length of part referred to, while "W" is maximum measurable width. All measurements are in millimeters, and, except for TL and WL, are subject to an error not exceeding ± .01 mm. The indices are given as percentages of HL, the cephalic index (CI) being HW/HL × 100, while the mandibulo-cephalic index (MI) equals ML/HL × 100.

Strumigenys biolleyi Forel

Strumigenys biolleyi Forel, 1908, Bull. Soc. Vaud. Sci. Nat. (5) 44: 43–44, worker (original description).

Strumigenys tridens Weber, 1934, Revista Ent., Rio de Janeiro, 4: 29–31, fig. 3, worker. NEW SYNONYMY.

Strumigenys luctuosa Menozzi, 1936, Arb. Morph. Tax. Ent. 3: 81–82, fig. 1, worker. NEW SYNONYMY.

Worker: TL 2.6–3.6, HL 0.60–0.81, ML 0.35–0.51, WL of largest specimen 0.86 mm.; CI 78–85, MI 58–66. Measurements from 51 specimens representing at least 10 nest series from the localities as listed below, except that in Chiapas, Mexico.

This species, like *S. smithii, S. prospiciens* and other members of the *mandibularis* series, possesses a small but distinct and acute intercalary tooth between the largest teeth of the apical mandibular fork, and two strong spiniform preapical teeth. In size, general proportions and facies, *biolleyi* closely resembles *smithii* and *prospiciens,* but differs from both in the shape of the propodeal lamellæ and, less strikingly, in having relatively slightly more slender mandibular shafts. In closely related species, each propodeal lamella forms an upper and a lower tooth or distinct angles separated by an excision or concavity (except in *hemidisca* sp. nov.; see below). In *S. biolleyi,* however, the upper (dorsal) of these angles is obsolete, represented by at most a feeble convexity, while the lower angle remains well-developed as a salient triangular tooth, acute but with a usually blunt extremity. In the more distantly-related *S. cordovensis* Mayr, a similar condition occurs as an inconstant variation, but in *biolleyi* the propodeal form varies only within very narrow limits and appears to be characteristic.

S. biolleyi lacks entirely the basal costulæ of the gastric dorsum, in this being even more extreme than is *S. prospiciens.* In a few specimens, in good light at magnification of 80× or more, rudiments of costulæ can be seen in the intersegmental groove, but these never extend onto the principal tergital surface; the latter is smooth and shining. *S. smithii* always has numerous distinct, fine basal costulæ. The petiole of *biolleyi* is like that of *smithii,* but in some specimens is very slightly more convex across the anterior nodal slope. The postpetiolar disc is very slightly broader than long to distinctly so, without longitudinal costulæ, finely punctulate, sometimes with the sculpture effaced in the center, so that the middle may be either opaque or shining.

Variation in this species is considerable, extending chiefly to size, color, proportions of head and mandibles (see quantitative data above), spacing and size of preapical mandibular teeth (distal tooth equal to or very slightly larger or smaller than the proximal), and presence or absence and abundance of the sparse, long, weak flagelliform hairs of the gastric dorsum. All of these characters seem to vary in random recombinations, relatively

constant within nest series, but completely intergradient between series and without discernible territorial regularity of the sort that marks geographical races.

The largest, darkest form, represented by the *luctuosa* type series, is ferrugineous-blackish, and agrees well with Forel's description of *biolleyi* from a similar, not-too-distant locality. It seems significant that Menozzi compared *luctuosa* to *smithii* and *prospiciens,* but not to *biolleyi.* Another extreme of variation lies with certain smaller, lighter ferrugineous or even yellowish series with brownish gaster, in which cotypes of *tridens* fall. In making comparison, Weber overlooked *biolleyi* and related species completely and went to an entirely different group to choose *S. rogeri* Emery, an Old World migrant species only superficially resembling his supposed novelty. Menozzi's figure is a more accurate representation than is Weber's.

The female of *biolleyi* differs in the usual ways from its worker. The CI of three females from different nests was 87 in each case, but other dimensions and proportions of head and mandibles were within the range of variation of the accompanying worker series. No males of this species were seen.

Forel based this species upon a single worker, presumably now in the Museum d'Histoire Naturelle, Geneva. The type locality is La Palma, Costa Rica, at 1600 meters altitude (P. Biolley). I have not seen the type specimen.

Material examined for the present study: Mexico: Finca Guatemoc, Chiapas, 3500 feet, one worker (C. and M. Goodnight). Guatemala: Mixco, one nest series (W. M. Mann). Honduras: Lombardia, one nest series, and San Juan Pueblo, one series (W. M. Mann). Costa Rica: Hamburg Farm, Sta. Clara, two series, and Parismina Br., Sta. Clara, one series (F. Nevermann). San José, one series at 4000 feet alt. (L. Hare). La Caja, 8 km. west of San José, four cotype workers of *S. luctuosa* (H. Schmidt), courtesy of Sig. M. Consani. Panama: El Volcan, Chiriqui, 4200 feet alt., one series (L. Hare). Barro Colorado Island, Canal Zone, cotype series of *S. tridens,* of which five workers were measured (W. M. Wheeler).

Cotypes of both *luctuosa* and *tridens* are preserved in the Museum of Comparative Zoology and in other collections.

The distribution of *biolleyi* is wide within Central America from Chiapas to Panama, and it appears to do well in both lowland and higher elevations. It is a forest species; most of the collections were noted as having been made in or beneath rotten logs.

Strumigenys smithii Forel

Strumigenys smithii Forel, 1886, Mitt. Schweiz. Ent. Ges. 7: 215–216, worker (original description). Mayr, 1887, Verh. zool.-bot. Ges. Wien 37: 569, worker. Emery, 1890, Bull. Soc. Ent. Ital. 22: pl. 7, fig. 2, worker. Forel, 1893, Trans. Ent. Soc. London, p. 375, female, male, biology. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 147, worker, in key. Some spellings omit final "i."

Strumigenys smithi var. *inæqualis* Emery, 1890, Bull. Soc. Ent. Ital. 22: 67, pl. 7, fig. 3, worker. NEW SYNONYMY.

Worker: Combined measurement-proportions ranges for all series studied are TL 3.0–3.3, HL 0.67–0.76, ML 0.36–0.42, WL 0.70–0.78 mm.; CI 80–87, MI 52–61; broken down by nest series below.

The head and mandibles of this species are much as shown by Emery in his figures 2 and 3 (1890, *loc. cit.*), which express the variation pretty well. The mandibles are intermediate in thickness and dentition between those of *S. planeti* Brown and *S. biolleyi* Forel, the distal preapical tooth being equal to, very slightly longer than, or distinctly shorter than the proximal; the latter situated at or near the apical third of the shaft of the mandible. The shafts are straight along most of the inner borders and gently convex along the external borders. The teeth of the apical fork are subequal, with an acute intercalary tooth between.

Head rather thick dorsoventrally, convex above. Alitrunk compact, with distinctly impressed metanotal groove, the propodeum curving into its declivity through a very broadly obtuse angle and in its entirety subequal in length to the promesothorax. Humeri bluntly angulo-tuberculate, trailing fine dorsolateral pronotal margins. Propodeal lamellæ forming distinct, usually blunt-tipped upper and lower teeth with a concavity between, the lower tooth usually the more prominent. Petiolar node obliquely depressed from in front and above, so that the anterior slope is nearly plane and the summit appears narrowly subangular in profile, disappearing almost immediately beneath the voluminous posterodorsal spongiform collar. Postpetiole distinctly (averaging about 1.3×) broader than long, with transverse anterior and posterior borders, only very feebly convex and margined

all the way around; surface with sculpture more or less effaced, except for a row of fine longitudinal costulæ along the anterior margin, shining; spongiform appendages of both nodes voluminous.

Pilosity typical for this and most related species. Ground pilosity of head consisting of short, inconspicuous spatulate hairs, reclining anteriad and appearing subappressed. Anterior clypeal border with longer spatulate hairs, five or six on each side of the center, the median pair about twice as long as the rest. Anterior scape borders each with eight or nine spatulate hairs, one or two near the base broader and directed basad, the remainder very slender, directed obliquely apicad. Alitrunk with a few scattered, very inconspicuous, short spatulate hairs. Several pairs of longer, conspicuous, stiffly erect hairs, truncate or narrowly spatulate apically, placed as follows: one medium pair on the center of the occiput and another placed one hair on the dorsolateral border of each occipital lobe. A large hair on each humeral tubercle, and one on each side of the mesonotum. A few serially arranged fine small hairs, usually reclinate posteriad, on each side of the dorsal propodeal face. Petiolar and postpetiolar nodes each with a very few long, fine, subflagellate hairs, curved posteriad. Gaster with a transverse row of four long upright subflagellate hairs springing from the anterior costulate portion; rest of gastric tergite I naked except for very sparse, very fine and minute appressed hairs, not ordinarily visible under magnifications of less than 60×. Apical gastric segments and venter with a sparse growth of weak, straggling flagellate hairs. Legs, antennæ and mandibles covered moderately densely with short, subappressed, linear-spatulate and pointed hairs. Mandibles with a row of strong, pointed, oblique hairs, few in number, directed anteromesad from their inner borders; these are especially characteristic of the entire *mandibularis* series of species.

Color in the medium ferrugineous range; gaster medium brown to dark reddish-brown. Basal gastric costulæ distinct, fine, numerous.

The above description was taken mostly from three cotype workers in the Museum d'Histoire Naturelle, Geneva and the Museum of Comparative Zoology at Harvard, stemming from the type locality, Itajahy, Santa Catarina, Brazil (W. Müller). HL 0.70–0.75, ML 0.36–0.38, WL 0.73–0.75; CI 84–85, MI 52–53. Five additional nest samples were examined from widely-spaced localities; since these samples all differ to some degree from the types and from each other, details of variation are cited for each case below. In view of the scanty material available, it is impossible to determine the taxonomic status of these samples satisfactorily at this time. The nature of the recombinations of characters, taken together with the width of range and quantitative departure of measurable features as related to their geographical

apportionment, makes it as easy to distinguish all these samples (and Emery's *inæqualis*) as separate species or races as it is to consider them merely units of one variable and widespread population. The latter course is chosen here because I believe that lack of more positive evidence of separateness of populations should be expressed in a conservative nomenclature, if only to prevent burdening the literature with names of highly hypothetical entities. It is a fact that the vast majority of ant "subspecies," even of those recently analyzed in the light of modern population-systematical principles, rests on unsatisfactory data.

San José, Costa Rica (H. Schmidt), 13 workers from two colonies: HL 0.67–0.71 mm.; CI 80–82, MI 57–61. Proximal preapical tooth slightly longer than distal. Lower propodeal teeth more prominent and acute than in types. Postpetiole weakly shining, finely costulate anteriorly.

St. Vincent, B. W. I. (H. H. Smith), one worker: HL 0.70 mm.; CI 85, MI 55. Propodeal lamellæ with both teeth forming low, blunt angles; concavity between correspondingly shallow.

Barro Colorado Island, Canal Zone (J. Zetek), one worker: TL 3.0, HL 0.67, ML 0.36, WL 0.70 mm.; CI 87, MI 54. Proximal preapical tooth slightly longer than distal. Propodeal lamellæ with lower teeth larger and more acute than uppers. Postpetiolar disc L 0.60, W 0.95 mm., weakly shining, with about eight feeble costulæ running its length.

Campinas, Goyáz, Brazil (Schwarzmaier), six workers: HL 0.71–0.75 mm.; CI 81–83, MI 54–56. Proximal preapical tooth slightly longer than distal. Postpetiolar disc subopaque, but only very indistinctly costulate.

Covendo, Bolivia (W. M. Mann), two workers: HL 0.72–0.76 mm.; CI 80–83, MI 54–56. Proximal preapical tooth slightly longer than distal. Postpetiolar disc costulate its length, interspaces punctulo-granulose, opaque. Both upper and lower, especially the lower teeth of the propodeal lamellæ distinctly longer and more acute than in any of the other series of this species.

Emery's var. *inæqualis* appears to be yet another variant in this series, with a notably reduced distal preapical tooth. Variation among these series also includes greater or lesser convexity

of the eyes. The basal gastric costulæ are rather constant in all series, being fine, numerous, and extending $\frac{1}{8}$ to $\frac{1}{7}$ the length of the otherwise smooth, very long basal segment.

The type of *inæqualis,* possibly in the Museo Civico di Storia Naturale, was taken in "Matto Grosso" by an unknown collector.

I have not seen the sexual forms of *S. smithii,* which were described by Forel in the 1893 reference cited in the synonymy. It should be born in mind that Forel's measurements are usually considerably less than those employed here for the same insects. In this same reference, Forel quotes H. H. Smith's notes on this species as it lives on St. Vincent, where it nests in rotten logs, or, more rarely, in sod. Workers were taken in fungi. The nest chambers were often found lined with a black fungus-like material, which induced Forel to speculate that it was a fungus-feeder; it is more probable that *smithii,* like some other members of the genus, feeds on collembolans and possibly other small arthropods. In Central America (Barro Colorado and San José) this species is found sympatrically with *S. biolleyi,* but is there not so common as on St. Vincent. No *biolleyi-smithii* intergrades have been seen.

Strumigenys hemidisca new species

Holotype worker: TL 2.78, HL 0.60, ML 0.39, WL 0.64 mm.; CI 82, MI 65. Closely similar to *S. smithii,* but smaller and with slightly longer mandibles relative to head size, also the following differences:

1. Preapical teeth of mandible farther apart and farther from the apical teeth; distal preapical tooth distant from the apical fork by about its own length, slightly longer than the proximal tooth; the latter situated at or very near the midlength of the mandible.
2. Eyes a little larger and more convex.
3. Alitrunk slightly more strongly depressed; propodeal dorsum virtually continuous with the very gradually sloping declivity.
4. Propodeal lamellæ modified into the form of low, nearly perfectly semicircular discs, only very feebly approaching straightness along one small portion of the generally rounded free edge and without traces of either upper or lower angles or teeth. These discs are feebly convex over their mesial and lateral surfaces and are densely punctate, continuing the sculpture of the adjacent lateral surfaces of the alitrunk.

5. Petiole and postpetiole as in *smithii,* disc of the latter very slightly more convex, shining, with a few very fine, short costulæ along the anterior border. Posterodorsal spongiform collar of petiolar node not so well developed.

6. Gastric basal costulæ vestigial, fewer than in *smithii* and not half so long, scarcely longer than the distances separating them.

7. Ground hairs of head slightly more conspicuous, but this may be due to darker integumental background color. Sparse appressed fine hairs of gastric dorsum extremely small and inconspicuous.

8. Color deep ferrugineous; gaster blackish-mahogany; mandibles and appendages lighter and more yellowish.

Holotype and the two accompanying paratypes taken in U. S. Plant Quarantine from orchid plants originating at an unknown locality in Venezuela (E. Q. No. A-42465; USNM Lot No. 37-20988), to be deposited in the U. S. National Museum; one paratype in the Museum of Comparative Zoology. The two paratypes are very similar to the holotype, scarcely differing in the usual measurements by more than the expected errors. One specimen has the gaster a bit lighter and more reddish in color than the holotype, and there is very slight variation in the degree of convexity of the propodeal lamellæ.

This species, the smallest member of the *mandibularis* series so far discovered, is apparently a member of the large and varied dacetine fauna inhabiting the epiphytes of the mountain rainforests of Colombia and Venezuela, scarcely known except through Plant Quarantine interceptions at U. S. ports of entry. Many species of this fauna remain undescribed, and quite a few of them possess significantly larger eyes than have their closest ground-living relatives. *S. hemdiisca* can be distinguished from all other species of *Strumigenys* known at present anywhere by the form of its propodeal lamellæ.

Strumigenys prospiciens Emery new status

Strumigenys smithi subsp. *prospiciens* Emery, 1906, Bull. Soc. Ent. Ital. 37: 167–168, fig. 26, worker (original description). Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 147, worker (in key).

Strumigenys mandibularis Fr. Smith (*partim*), 1860, Jour. Ent. 1: 73, pl. 4, figs. 7, 9, 11, worker, *nec* female. Forel, 1911,

Sitzb. Bayer. Akad. Wiss., pp. 263–264, worker only. Emery, 1922, Gen. Ins. 174: 322.

Worker: TL 3.22–3.51, HL 0.74–0.80, ML 0.41–0.46, WL 0.75–0.82 mm.; CI 79–83, MI 56–60. Measurements from eight workers representing three different nest series from two Bolivian and one Brazilian localities.

Very similar to *S. smithii,* but a little larger and more slender. Mandibles slender, the preapical teeth a bit farther apart, the distal slightly longer than the proximal. Eyes fairly large, convex, protruding somewhat anteriorly as well as laterally, but not quite so strikingly so as in Emery's figure of 1906. Alitrunk a bit more slender and more depressed than in *smithii;* propodeal lamellæ lower, with more obtuse upper and lower angles and only weakly concave between. Petiole with a slender peduncle rising gradually to its node; anterior face and summit of node convex in both directions (depressed in *smithii*). Postpetiole about as broad as long, length or width favored slightly in different series, its disc weakly convex, evenly and densely punctulate and opaque, often with a few very fine, short longitudinal costulæ along the anterior margin. The basal costulæ of the gaster are vestigial, in many cases hardly perceptible, and are not or scarcely longer than their intervals. The gaster is smooth and shining, with rather long flagellate hairs, some of which may loop back to the integumental surface; these hairs, while sparse, are considerably more numerous and generally distributed than in *smithii.* Color approximately as in *smithii,* but a little more variable; gaster sometimes approaching black.

The female (Rurrenabaque series, see below) differs in the usual ways from the accompanying workers: TL 3.7, HL 0.78, ML 0.42, WL 0.90 mm.; CI 82, MI 54. Eyes very large. Ocellar area blackened; mesopleura bright yellow, largely smooth and shining. Propodeal lamellæ more prominent, with the upper tooth slightly more acute than in worker. Postpetiolar disc more convex and with longer, stronger costulation. Medium ferrugineous, gaster darker.

When Smith described *S. mandibularis,* he included two very different species. In 1887, Mayr restricted the female of *mandibularis* as the type of that species, leaving the workers described by Smith without a name, although Mayr thought his *S. saliens* might correspond to these. In view of Mayr's restriction, Forel's synonymization of *prospiciens* with *mandibularis* must be rejected. On the other hand, the workers found by Forel in the Munich Museum in 1911, and which he realized were the same as Emery's *prospiciens,* really were a part of Smith's original *mandibularis* type series, taken by Bates in Amazonas,

probably at Ega (Tefe), and almost certainly not at "St. Paul," as Smith gave in his 1860 paper. That Smith's small *mandibularis* workers and Emery's *prospiciens* represent the same species seems certain, especially in view of the correspondence between two workers sent from the British Museum with Emery's brief but relevant description and his figure. The British Museum specimens bear only a small circular label reading "59 [or 5g] 10" and without direct locality statement, but I believe them to be part of Smith's *mandibularis* small worker series, if only because no other workers among the *Strumigenys* series can be the right ones; I have been able to confirm this during a recent visit to the British Museum. In addition to these presumed types of worker *mandibularis,* supposedly taken by H. W. Bates in Amazonas, I have seen a small series of workers with a dealate female from Rurrenabaque, Rio Beni, and a single worker from Sta. Helena, both localities in Bolivia (W. M. Mann), which are referable to *S. prospiciens.* Specimens are in the U. S. National Museum, Museum of Comparative Zoology and elsewhere. I have not seen the type of *prospiciens,* in the Museo Civico di Storia Naturale, Genoa. Type locality: Puerto Piray, Misiones, Argentina (F. Silvestri).

It should be noted that *prospiciens* and *biolleyi,* which are separable on the basis of the shape of the propodeal lamellæ and some other slight differences of mandibular proportions, etc., are nevertheless very closely related. The fact that they are, so far as is known, completely allopatric might indicate that they are geographical races of one species if one chooses to interpret such slender evidence as a case of polytypy. *S. prospiciens* cannot, however, be logically regarded as a subspecies of *S. smithii,* since the two forms apparently occur together over a wide part of South America without producing intergrades. We have no biological information concerning *S. prospiciens,* but it is most probably a rainforest species.